Was Refurbishing the Point Lepreau Nuclear Generation Station a Mistake?

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In the September 2020 provincial election campaign, both the Liberal and Progressive Conservative parties touted Small Modular Nuclear Reactors (SMRs) as an important economic development opportunity for the province. To dampen public enthusiasm for SMRs in the province, critics and opponents of this opportunity invoked the experiences of the "ghosts of development projects past" like Bricklin, Orimulsion, JOI Scientific's Saltwater Hydrogen, and the Point Lepreau Nuclear Generation Station. For the SMR economic opportunity for the province, Point Lepreau has particular salience. The nuclear power station was built in part because it was an economic opportunity for the province. Later in the 2000s, refurbishing Lepreau was "First of a Kind" project that carried recognized substantial risks for the province. Today, the Point Lepreau Generation Station is most often discussed in terms of its operational challenges, cost over-runs and resulting debt for the province without delivering on the promised economic benefits.

Are the experiences with Point Lepreau a cautionary tale for the province when it comes to SMRs or any other risky development opportunity? I have previously written about the challenges of evaluating megaprojects after the fact to judge government decisions made under uncertainty with the case of Muskrat Falls in Labrador. My main point was that perspective on decisions matters. The inevitable conclusion from projects that (after the fact) incurred losses, is that decision makers in hindsight made poor decisions and that the lesson of those hindsight mistakes, or regrets, is that governments should not pursue any project that looks risky when a perceived safer investment is available.

Is that use of history, or hindsight analysis, a good guide for better decisions when it comes to developing the economy? I can't answer that question but I can offer up some "revisionist history" for the Point Lepreau refurbishment project that raises a cautionary tale for weighting a historical narrative too heavily when evaluating the prospects of new opportunities with the potential to develop the economy.

Consider two questions that we can answer in 2021. What would the province have done for meeting energy needs in the province if it had not chosen to refurbish Point Lepreau in the mid-2000s? Would we be better off today if that other option had been taken? To answer those questions we have the benefit of the 2002 New Brunswick Board of Commissioners of Public Utilities (the Regulator) recommendation that refurbishing Point Lepreau was "not in the interests of the province" as defined by provincial legislation at the time. Public interest for the regulator was largely that of keeping power rates affordable for customers and did not include concerns over the environment or economic development. I also reached out to individuals knowledgeable about the power industry in the province and who were familiar with the 2002 EUB recommendation. What follows is my interpretation and analysis and not that of anyone who was patient and generous enough to answer my questions.

It is my understanding that, historically in New Brunswick, electricity generation choices have been largely about cost. Aside from the St. John River, the province has no energy assets meaning fuel for generation, or electricity directly, is imported. Decisions around what fuels to use for generation be it oil at Coleson Cove, Orimulsion at Dalhousie, or coal at Belledune reflected expectations over the near

term and future costs of the imported fuels. The decision to build Point Lepreau's Nuclear Generation Plant in 1975 occurred during the OPEC energy crisis. Rising oil prices, and oil shortages, were also spurring interest in alternative energy sources like natural gas and renewable wind and solar.

As the original Point Lepreau Generating Station was nearing the end of its expected operational life in 2002, NB Power needed to plan for how to meet the province's energy needs. Two options were reviewed by the Regulator -- refurbish Point Lepreau and have it continue generating power for the province until 2040, or construct and install either new natural gas generation or Orimulsion (baseload) generation capacity. Ultimately, Orimulsion was not an option evaluated for the recommendation. On a cost basis the natural gas and nuclear generation were deemed equivalent by the Regulator but nuclear refurbishment would add 50 percent more generation capacity for the same cost than the natural gas generation alternative. On the other hand, the lower capital costs of the natural gas generation option, and its better known generation technology, made that option seem the lower risk for power customers and the utility. At the time, Lepreau would be the first CANDU reactor to be refurbished and that "first of a kind" project carried cost risk.

The Regulator's recommendation based on the larger capital costs of Lepreau and risks of cost over-runs, which they correctly foresaw (but underestimated), was that NB Power should proceed with constructing natural gas generation capacity and shutter the Point Lepreau Nuclear Generation Station. In the end, however, the Provincial Government did not follow the recommendation and the refurbishment of Lepreau proceeded. Cost over-runs did occur and the refurbishment was $1 billion dollars over budget (and three years late in being completed) eventually costing $2.4 billion which is now a large chunk of NB Power's debt. The cost over-runs of building the Lepreau generation station in the first place were also substantial and represent another big portion of NB Power debt.

What is remarkable in hindsight about the Regulator's decision to not recommend that Point Lepreau be refurbished was that it rejected NB Power's foresight about the need to de-carbonize its generation. NB Power built a carbon price of $15 per tonne of CO2 (roughly $20 in today's purchasing power) into its investment analysis of the Lepreau refurbishment, tilting the benefit cost ratio toward nuclear generation over natural gas. The Regulator, however, rejected the CO2 reduction case as being in "the public interest" as defined by the legislation for the regulator's mandate in 2002:

"NB Power used a value of $15/tonne in its analysis of the costs that it may be required to pay, in the future, for its CO2 emissions. The Board, as an economic regulator, has not examined the issue in any detail because consideration of such externalities is outside the Board's mandate. The Board considers that it can only review the costs of complying with currently established standards. It is the opinion of the Board that air emissions should be regulated by an appropriate agency of the provincial government. The Board appreciates that this issue is of significant concern to the Province and accepts that refurbishment of Point Lepreau would reduce CO2 emissions".

It is indisputable that the Lepreau refurbishment project had budget over-run and delays in completing the work to get the plant on-line. But at this point the narrative on Point Lepreau gets a bit murkier as we consider the climate impacts of the project and even the operational performance of the refurbished plant.

In April of this year, CBC reported on a shutdown of Point Lepreau as symptomatic of the facility's struggles with reliability since emerging from refurbishment in 2012. Since re-starting, Point Lepreau has

not operated roughly 600 of 3000 total days, 20 percent of potential operating time, due to maintenance and disruption, double what NB Power had projected in its 2002 Lepreau refurbishment proposal. The article reports that NB Power acknowledges that the poorer than expected performance has impacted NB Power's financial performance. Green Party Leader David Coon predicted that "with the plant getting older all the time, future problems are more likely, not less… There's no chance it's going to make it to 2040 without significant problems". But with the recent investments in the non-nuclear parts of the plant, Lepreau may be headed to the reliability that NB Power expected was possible in 2002. Counter to David Coon's pessimism over future Lepreau performance, NB Power vice-president and chief financial officer Darren Murphy in February 2021 argued that "past performance is not a good indicator of future performance" for Point Lepreau.

What is interesting about the views of the CBC report framing Lepreau's operations as sub-par or poor, is that performance since refurbishment is at least as strong as the Regulator expected in 2002 when it assessed the financial case for refurbishing the nuclear plant. You can read the 2002 decision which tested the assumptions of the NB Power case and costing for each generation option. NB Power had originally submitted an expectation for 90 percent utilization for Lepreau which the regulator deemed was too high given past utilization factors for the facility. The regulator assessed that the likely utilization factor (the percentage of potential time Lepreau would be operational) would be 80 percent. Point Lepreau has operated as expected.

Would we be better off today if the regulator's recommendation had been followed? From my communications with people knowledgeable about NB Power at the time, it looks like if Lepreau had not been refurbished NB Power likely would have had needed three coal or Orimulsion generation facilities plus Belledune to meet the province's power needs. The generation would not have been from natural gas given the supply considerations for the province and the rising natural gas prices in the mid 2000s which were at the time escalating and looking like a volatile priced energy for baseload generation.

If NB power didn't have Lepreau today, with three additional coal or other fossil fuel generation plants in operation today, its emissions profile would be dramatically different. With Lepreau, the province's GHG emissions from electricity are 3.2 Megatonnes per year (Mt/year), mostly from Belledune's coal-fired station and the balance of emissions coming from Coleson Cove (Heavy Fuel Oil), and Bayside generation facilities. The counterfactual level of emissions without Lepreau is not a straightforward projection since not all generation units run all of the time – with Lepreau, some like Coleson Cove and increasingly with Belledune, only supply power during peak demand and stand by as emergency backup generation. One best guess is that without Lepreau, to generate the same total supply of electricity per year as with Lepreau with fossil fuel generation the province's emissions from electricity generation would be over 8 Mt/year instead of the 3.2 Mt/year with Lepreau. To put that in perspective in terms of meeting climate goals, without Lepreau today the province would be at GHG emissions levels last seen in 2005… we would have had no progress to meeting climate reduction targets despite the province's de-industrialization since 2006.

Coal fired generation is to be phased out by 2030 but even without that requirement, the province without Lepreau would have been going through a painful energy transition. Under the current Federal carbon pricing requirements for large emitters under the Strengthened Climate Plan, 8.5 Mt/year of emissions priced at $50/tonne would require NB Power to pay and recover through power prices, $250 million/year in carbon taxes in 2021, and $850 million/year at $170/tonne in 2030. And remember, the

cost over-runs for Point Lepreau's refurbishment were of this latter magnitude but were incurred once, not annually.

There is also the complication that coal generation is to be shuttered by 2030 under the federal climate plan which would leave the province short of baseload generation and booking the value of the "stranded coal assets". In 2020 NB Power projected that the cost of coal phase out in 2030 for Belledune instead of the 2040 planned retirement date for the plant would require large investments "in either new infrastructure to allow for alternative fuels to be used at Belledune or new generation with similar operating characteristics (i.e. dependable and predictable (dispatchable) generation with the ability to be base loaded)". NB Power calculated that early phase-out of coal creates a cost burden in excess of $1 billion ($2020 NPV) for New Brunswickers. If we had four fossil fuel generating stations to shutter instead of one, you can do the math, then our inability to have foreseen the future shift in climate priorities would have been an expensive mistake in hindsight.

The point of this commentary is not to defend the Lepreau refurbishment decision, or to convince you to embrace nuclear energy. The point is to ask you to think through whether hindsight narratives of past decisions like refurbishing Point Lepreau are useful guides for future decisions like pursuing the SMR opportunities for economic development.

When it comes to evaluating economic development decisions of the past, hindsight is not twenty-twenty. It requires more imagination than Regulators are permitted, or that politicians and advocates find useful, to consider the counterfactual world that we would be living in today had different decisions been made.